University of California, Berkeley
Physics H7B Spring 1999 (*Strovink*)

PROBLEM SET 7

1. Purcell problem 4.8

2. Purcell problem 4.20

3. Purcell problem 4.25

4. Purcell problem 4.26

5. Purcell problem 4.30

6. Purcell problem 4.31

7. Purcell problem 4.32

8. (Taylor & Wheeler problem 19)
(a.)
Two events P and Q have a spacelike separation. Show that an inertial frame can be found in which the two events occur at the *same time*. In this frame, find the distance between the two events (this is called the *proper distance*). (*Hint*: one method of proof is to assume that such an inertial frame exists and then use the Lorentz transformation equations to show that the velocity βc of this inertial frame, relative to the frame in which the events were initially described, is such that $\beta < 1$, thus justifying the assumption made.)
(b.)
Two events P and R have a timelike separation. Show that an inertial frame can be found in which the two events occur at the *same place*. In this frame, find the time interval between the two events (this is called the *proper time*).